ELECTRICITY IN SURGERY;

FAURE'S STORAGE BATTERY,

ALSO

SWAN'S ELECTRIC LIGHT.

BY

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FAURE'S STORAGE BATTERY.

A detailed description of this battery is contained in *Nature* for the 19th of May, 1881, page 68; and a report, as to the amount and durability of the electric energy which can be stored up in it, appeared in the *Times* of the 9th June in a letter by Sir William Thomson, to whom I am indebted for the description contained in this paper.

THE GALVANIC ECRASEUR.

The instrument which I employed was of French construction. It had some defects in action, which I have observed in others of a similar kind. These I mentioned to Sir William Thomson, and he kindly undertook to have them remedied. Acting on his instructions, Mr. White, the optician and maker of scientific instruments to the University, has made one for me, which seems perfect, both as a mechanical and galvanic instrument.

G. B.

NÆVOID TUMOUR OF THE TONGUE, REMOVED BY THE GALVANIC EXCRASEUR, HEATED BY FAURE'S STORAGE BATTERY.

The ingenious invention of Mons. Faure will render electricity much more available for surgical purposes than hitherto, inasmuch as it furnishes the surgeon with a battery capable of providing a current sufficient as to duration and power for all purposes to which it is likely to be applied. It is so light that it can easily be carried from place to place; and it can be used in the sick-room without any preliminary arrangements, such as are necessary when the ordinary voltaic battery is employed.

It is a realisation of aspirations of scientific electricians, which a few weeks ago were considered visionary, or, at all events, only the possibilities of a distant future.

A Faure's Storage Battery consists of a cylindrical jar, made of lead, open at the top, about 9 inches in height, and 5 in diameter; into this is packed a sort of double pad, rolled up like a scroll but loosely, so as to admit of dilute sulphuric acid in the jar getting access to every part of its surface. The pad is about three-quarters of an inch thick, and consists of two sheets of lead, each plastered on each side with red lead, with separating layers of thin felt. One of the lead sheets is connected to the containing lead jar, which is itself also plastered internally with red lead guarded with felt. This lead (sheet and jar connected) constitutes the negative electrode of the

cell. The positive electrode consists of the other sheet of lead; and suitable terminal wires are soldered to them both.

When these wires are connected to the poles of a battery generating electricity, whatever be the nature of the generating source, the electricity flows into the Faure's jar, and causes peroxidation of the red lead on the positive plate, and precipitation of metallic lead in spongy condition on the negative plate. The electro-chemical reaction from this is always ready to give back electricity nearly equal in amount to the whole that flowed in when the jar was being charged.

After being charged the jar remains ready for use, and may be kept so for a very long time. Sir William Thomson found that in a jar kept for ten days after being charged, the loss of energy, if any, was not such as practically to impair the efficiency of the cell.

The weight of the apparatus being only eighteen pounds, it can easily be carried from place to place. When connected to the poles of an instrument provided with an arrangement for completing and breaking the current, it serves instead of an ordinary generating battery, and Sir William Thomson has reported that each jar can store up 260,000 foot-pounds of electric energy—far more than sufficient for any surgical operation where it is likely to be available.

The following case is interesting, because of the rarity of the disease, and because it is the first instance of the use in surgery of a storage battery.

H. M., a boy aged 9 years, in every way in good health, was the subject of a nævoid tumour of the tongue. It was noticed soon after his birth, as a slightly-raised purple patch on the right side of the tongue near the tip. It seemed to grow with his

growth rather than to extend into the tongue, and, till recently, had given him no annoyance. Within the last few months it had grown more prominent, and on several occasions had bled freely when it had been slightly scratched by a broken tooth, which, however, has since been removed.

I saw him in consultation with Dr. Paterson of Partick on the 1st June. I found the tumour to be situated on the anterior half of the right side of the tongue. It was purple in colour, and felt nodulated and spongy--becoming paler when pressed on, as if partly erectile. Its size was about that of a small walnut, and it was visible on the upper and under surface of the tongue, to the median line of which it closely approached. It was a nævus of the venous variety, with a good deal of tissue intersecting it, and was so vascular that any attempt at excision would have been attended with great risk from hæmorrhage. I determined therefore to remove it by the thermo-cautere or ecraseur. Having had an opportunity of meeting Sir William Thomson just at that time, I asked him if he could furnish me with any sort of galvanic battery, less weighty and cumbrous than the voltaic apparatus in ordinary use. He told me of the Faure's cells which he was engaged in testing, and most willingly offered me the use of one.

Accordingly, on the 3rd June I called at the Physical Laboratory in the University, and got away with me in my carriage one of those wonderful jars, which I took, all ready prepared, to the patient's house.

The boy was placed under the influence of chloroform, and the tongue was pulled out by a catch forceps. A strong curved hook was passed through the tongue from below upwards, behind the centre of the tumour and beyond it so as to pass through healthy tongue tissue, and with this I pulled forward

the tumour and tongue. Half-a-dozen needles with sealing-wax heads were now introduced through the tongue in the same way as the hook, thus forming a circumference of stakes, circumscribing the tumour. The platinum wire of a galvanic ecraseur was now passed over the projecting parts of the needles and tightened till it grasped the tumour. The wires from the jar were connected to the instrument, and the circuit was completed by pressing a spring on the handle, and in less than a minute the tumour was removed without the loss of a drop of blood.

15th June.—The eschar left by the heated wire has separated, leaving a healthy granulating surface, which is rapidly cicatrising.

SWAN'S ELECTRIC LIGHT IN THE DIAGNOSIS OF HYDROCELE.

This kind of illuminating agent is specially useful in examining parts of the body or tumours which we wish to test by transmitted light.

I have under my care a man who is compelled to be in the recumbent posture owing to a fracture of the thigh, complicated with a wound of the soft parts though not leading to the fracture. He also had a tumour in the scrotum with all the characteristics of a hydrocele. It was difficult to judge of its translucency in consequence of its being bound down, and it was impossible in the man's fixed position to get a candle or lamp placed in a suitable situation for the examination. At the same time that Sir William Thomson offered me the battery before alluded to, he suggested that Swan's electric light might be used for surgical examinations, and kindly offered me the use of a suitable apparatus. He pro-

vided me with a powerful Grove's battery, sent his mechanic assistant to fit it up in my ward in the Western Infirmary, and gave me a Swan's electric lamp. This is a globe of glass about $1\frac{1}{2}$ inch in diameter, very perfectly exhausted of air, containing a filament of hard carbon twisted into a loop, which, when rendered incandescent by an electric current passing through it, gives out a powerful light. The current is produced by applying a voltaic battery to two platinum wires passing through the glass and attached to the ends of the carbon filament inside; these platinum wires being hermetically sealed into the glass, to prevent air from entering and vitiating the vacuum essential for the non-burning of the incandescent carbon. The glass globe, which is held by a handle of glass tube about four inches long, can be placed in any position, and as it is not heated beyond what can easily be borne by the skin, it can be put into actual contact with any part of the tumour without danger of setting fire to the bed-clothes.

It proved most successful, for even in a ward where the bright sunlight could not be effectually shut out, the translucency of the hydrocele was made apparent to every student.

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